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Totsuka

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(54) **IMAGE FORMING APPARATUS**

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G03G 15/00 (2006.01)

(52) **U.S. Cl.**
CPC ***G03G 15/6529*** (2013.01)

(58) **Field of Classification Search**
CPC G03G 15/5029
USPC 399/388
See application file for complete search history.

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(57) **ABSTRACT**

An image forming apparatus includes an image carrier that carries a developer image, a carrying part that carries a medium; and a guide part that forms a carrying path to guide the medium carried by the carrying part toward a transfer position where the developer image carried by the image carrier is transferred to the medium. The guide part is configured to change a thickness of the carrying path according to a kind of the medium.

16 Claims, 13 Drawing Sheets

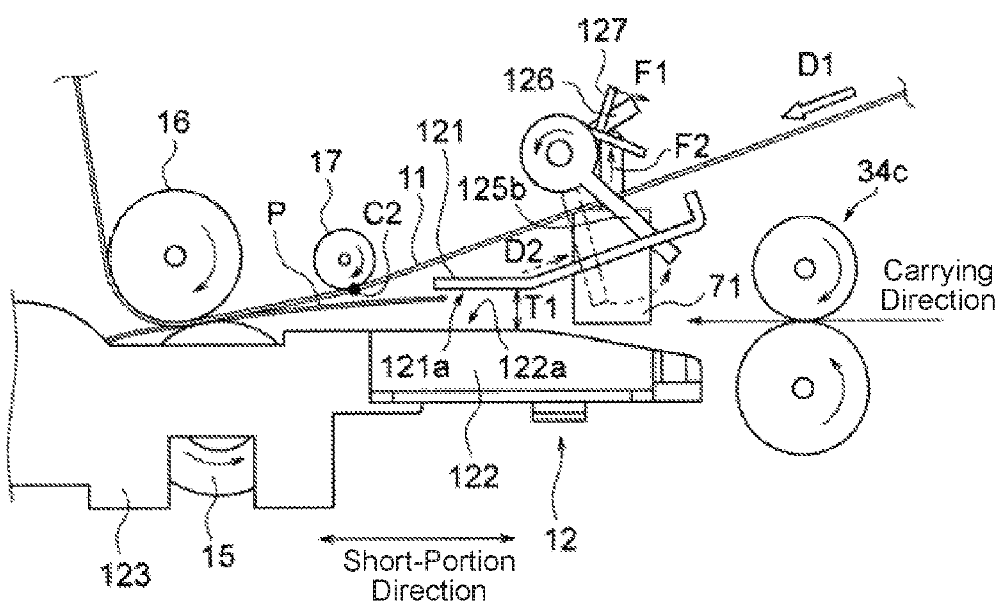
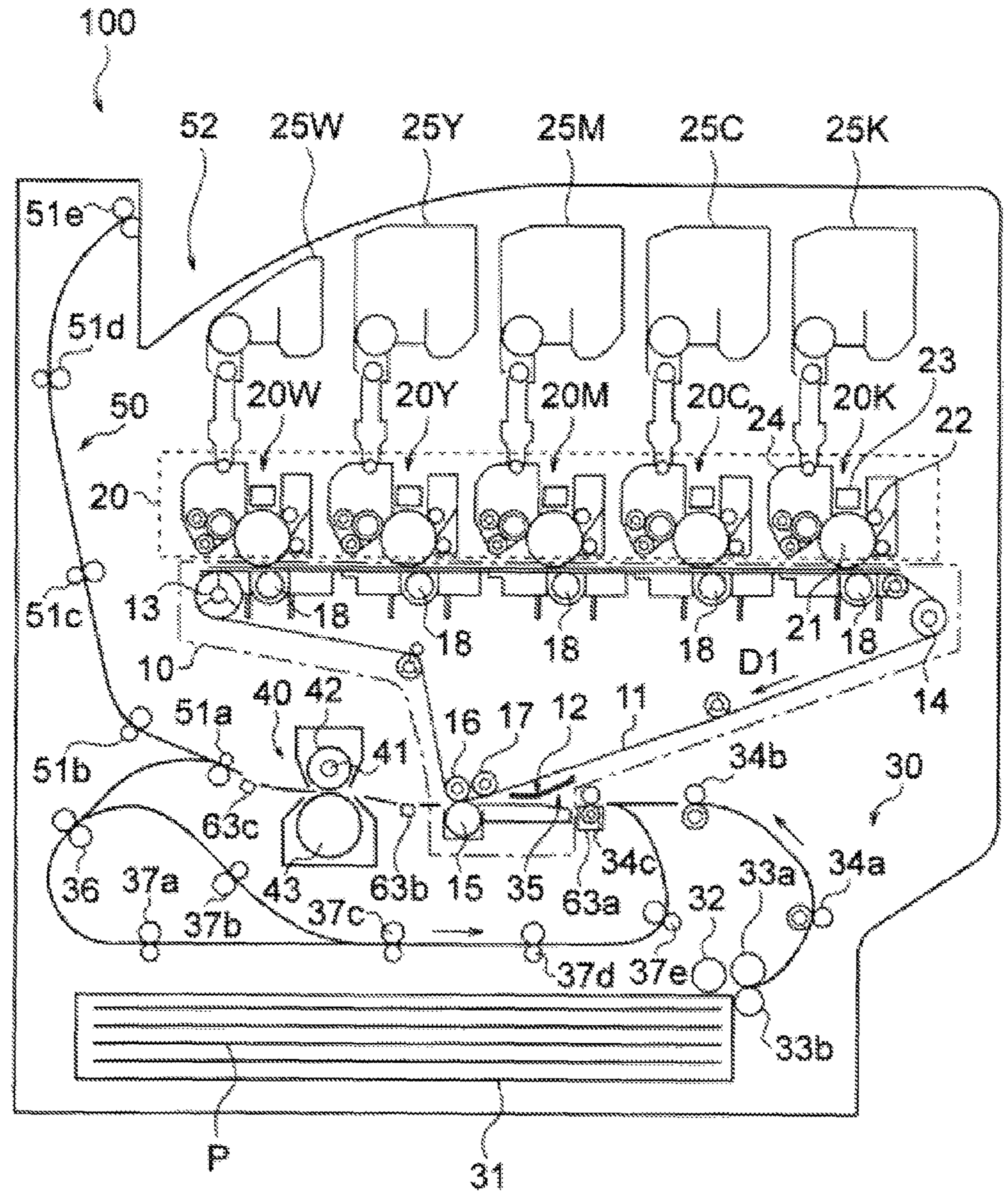


Fig. 1


100
52
25W
25Y
25M
25C
25K
51e
51d
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20W
20Y
20M
20C
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22
20
51c
13
18
18
18
18
21
18
10
D1
14
40
42
51a
41
16
17
12
11
34b
30
51b
63c
36
37a
37b
43
37c
63b
15
35
63a
34c
32
33a
34a
37d
37e
33b
P
31

Fig. 2

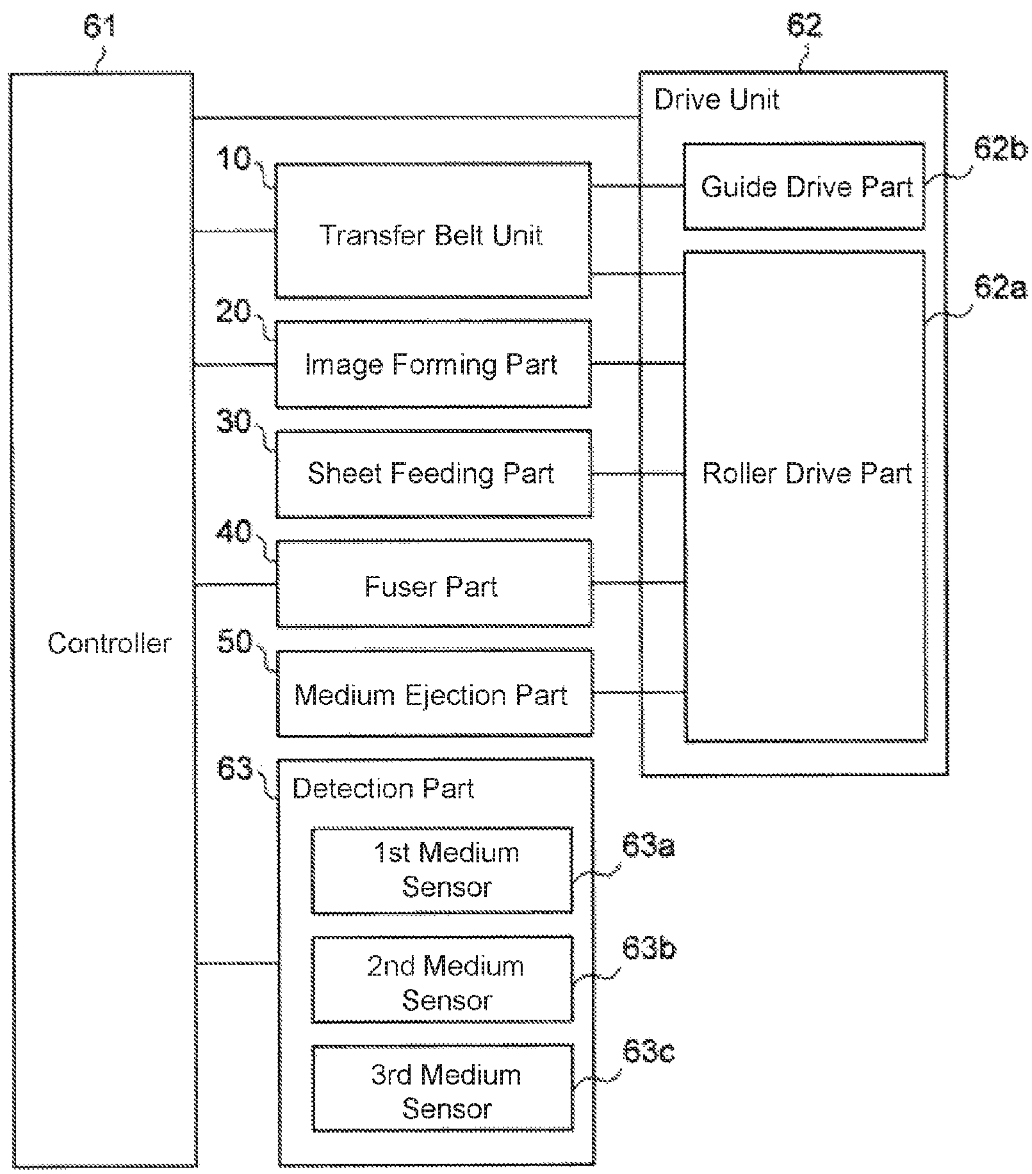

61
62
Drive Unit
Controller
10
Transfer Belt Unit
20
Image Forming Part
30
Sheet Feeding Part
40
Fuser Part
50
Medium Ejection Part
62b
Guide Drive Part
62a
Roller Drive Part
63
Detection Part
63a
1st Medium Sensor
63b
2nd Medium Sensor
63c
3rd Medium Sensor

Fig. 3

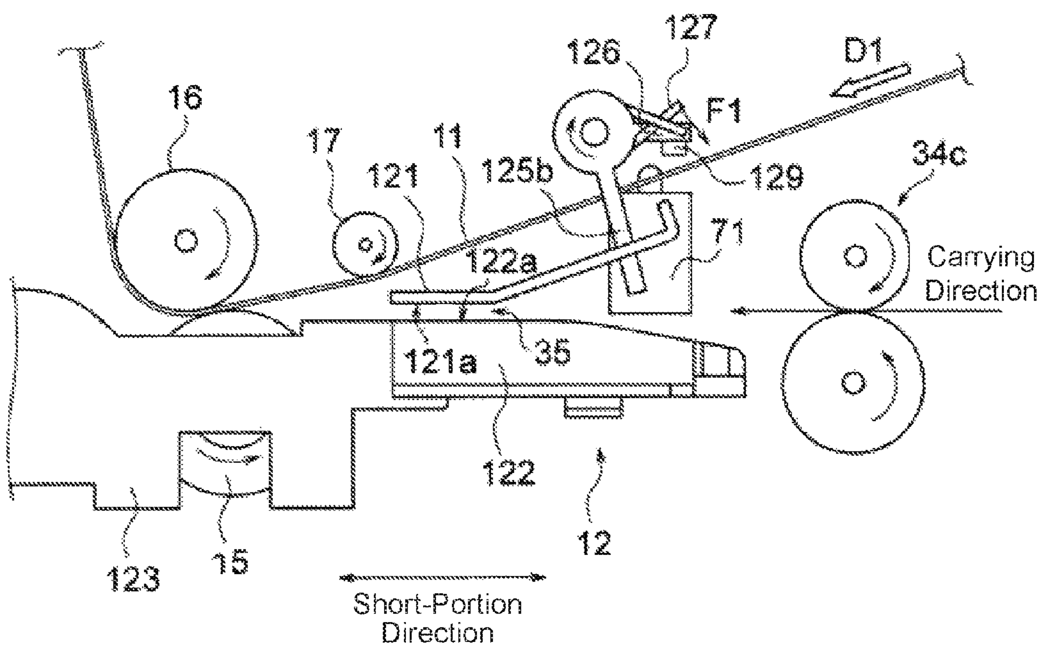

127
126
D1
F1
16
17
11
121
125b
129
34c
71
122a
Carrying
Direction
121a
35
122
12
123
15
Short-Portion
Direction

Fig. 4

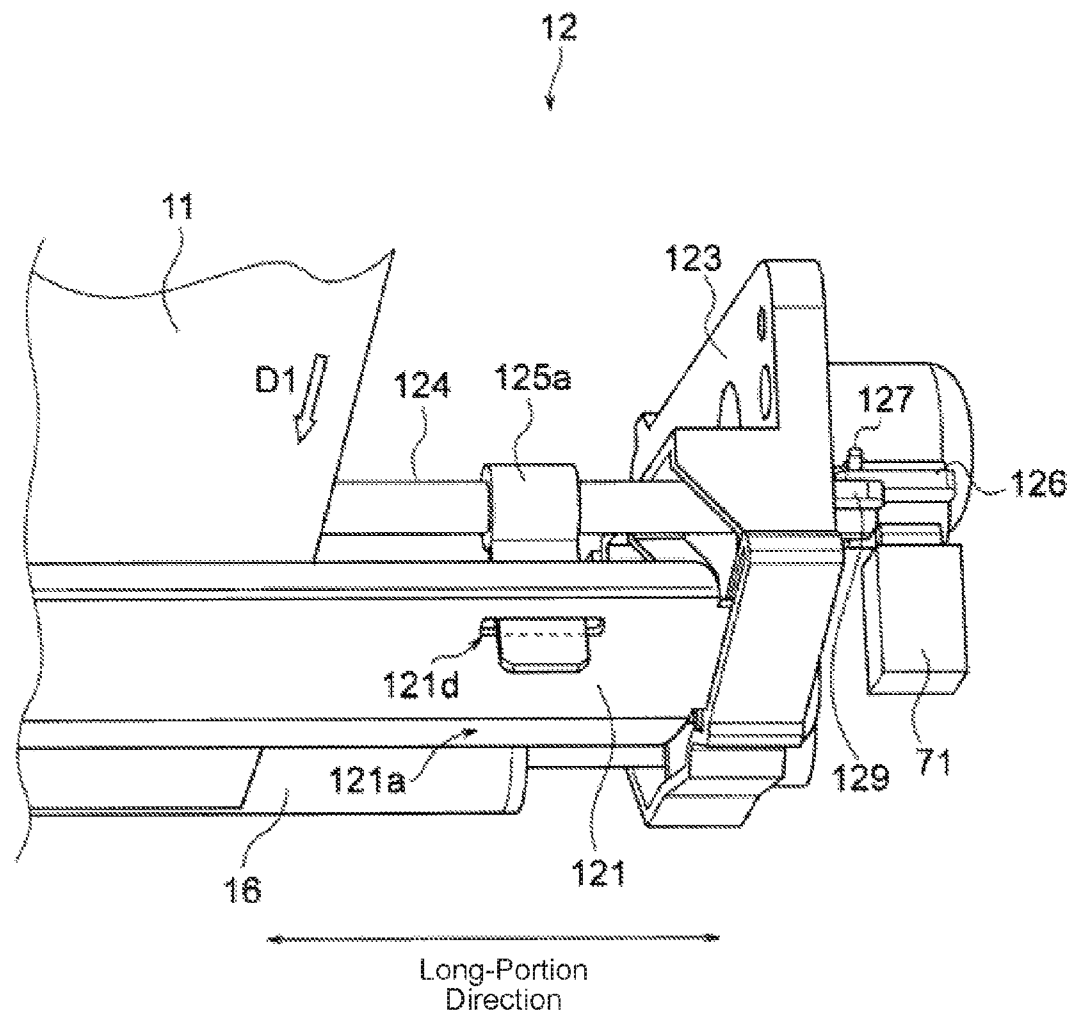
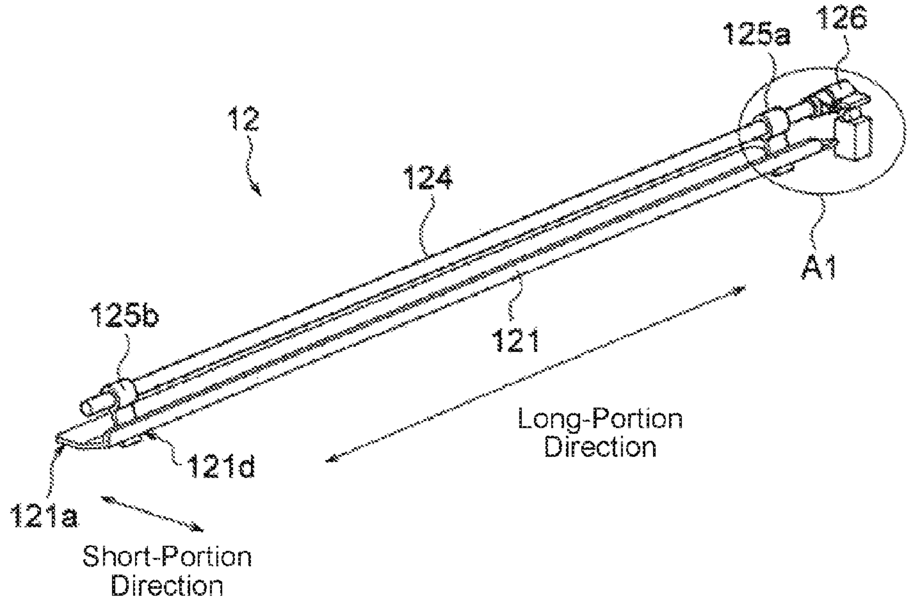
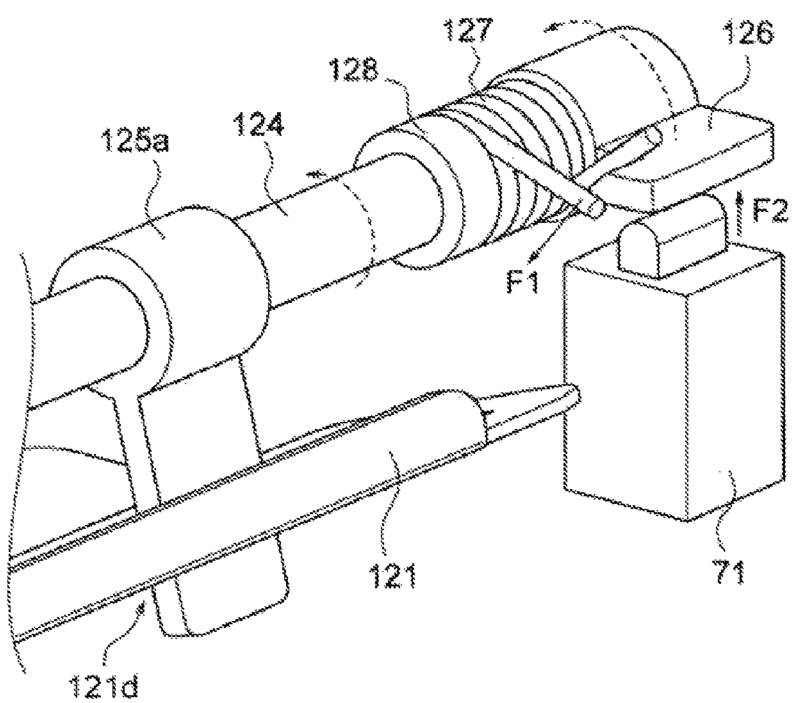

12
11
D1
124
125a
123
127
126
121d
121a
129
71
16
121
Long-Portion
Direction

Fig. 5A



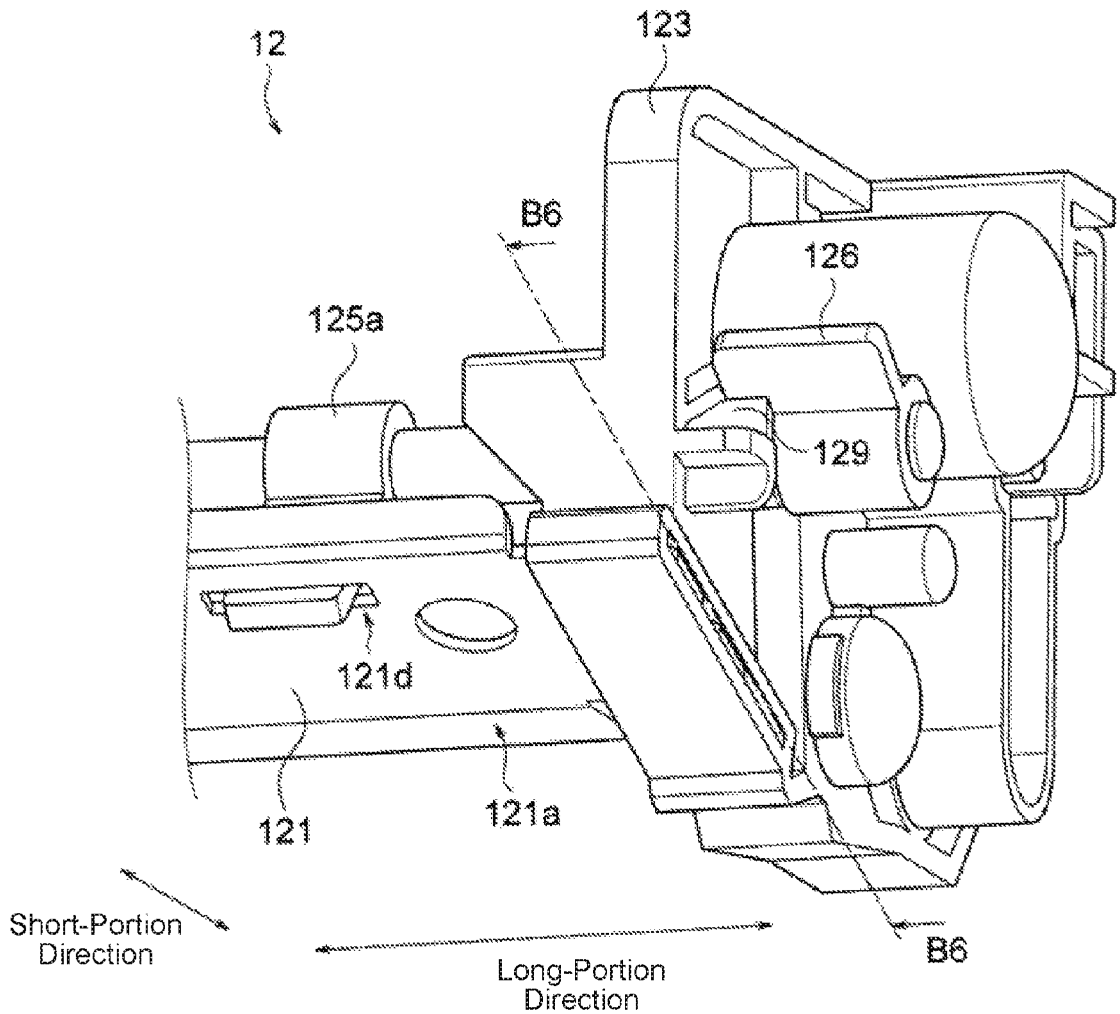
126
125a
12
124
A1
125b
121
Long-Portion Direction
121d
121a
Short-Portion Direction

Fig. 5B



127
126
128
125a
124
F2
F1
121
71
121d

Fig. 6



12
123
B6
126
125a
129
121d
121
121a
B6
Short-Portion Direction
Long-Portion Direction

Fig. 7

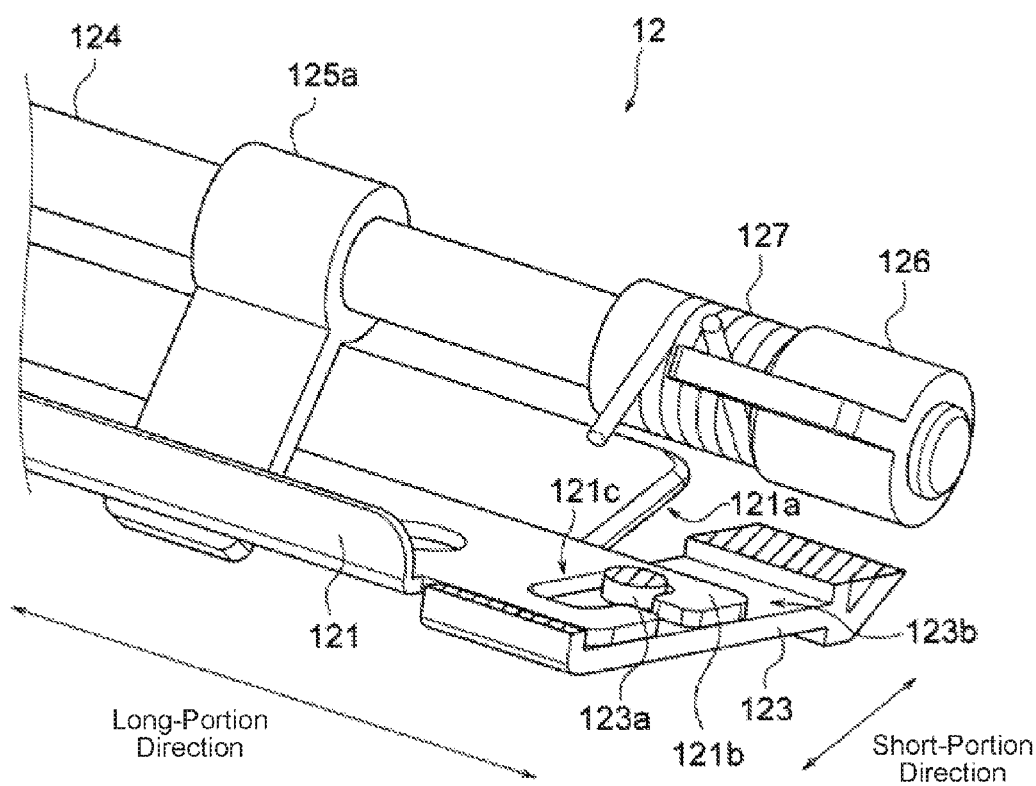

124
125a
12
127
126
121c
121a
121
123b
123a
123
121b
Long-Portion Direction
Short-Portion Direction

Fig. 8A

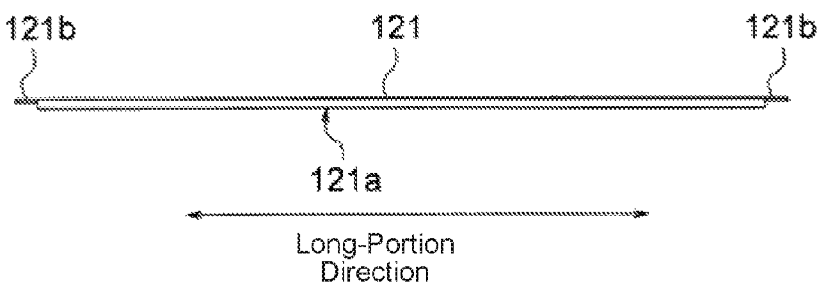

121b
121
121b
121a
Long-Portion
Direction

Fig. 8B

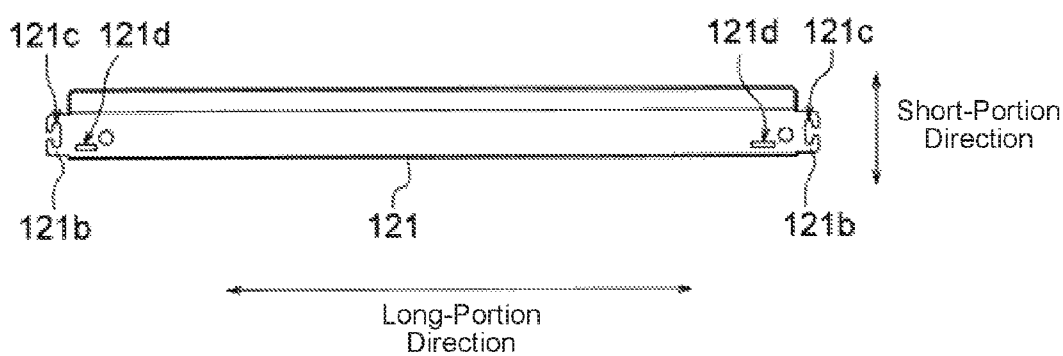

121c 121d
121d 121c
Short-Portion
Direction
121b
121
121b
Long-Portion
Direction

Fig. 9

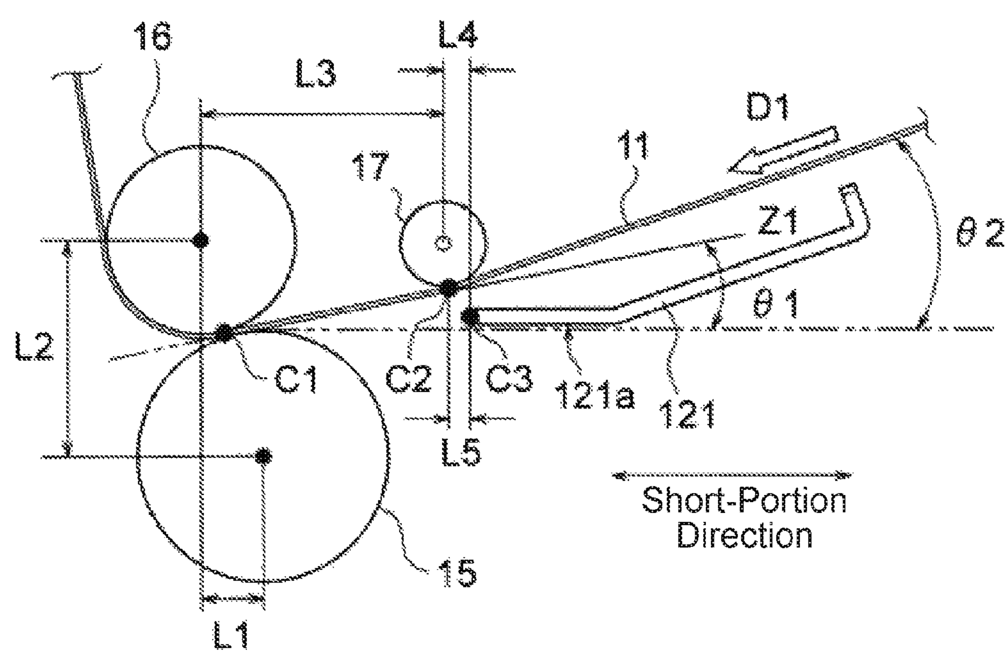

16
L3
L4
D1
11
17
Z1
θ2
θ1
L2
C1
C2
C3
121a
121
L5
Short-Portion Direction
15
L1

Fig. 10A

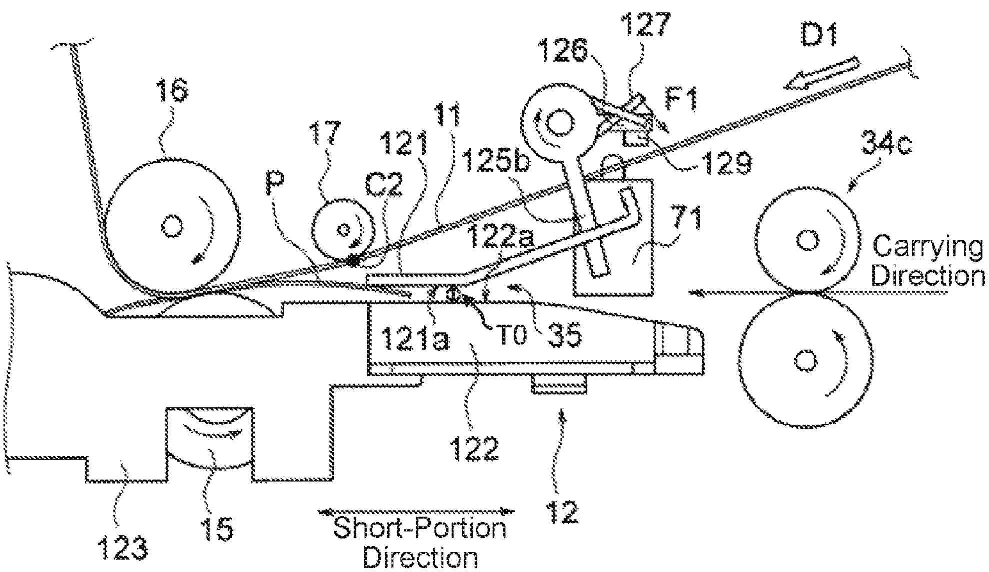


Fig. 10B

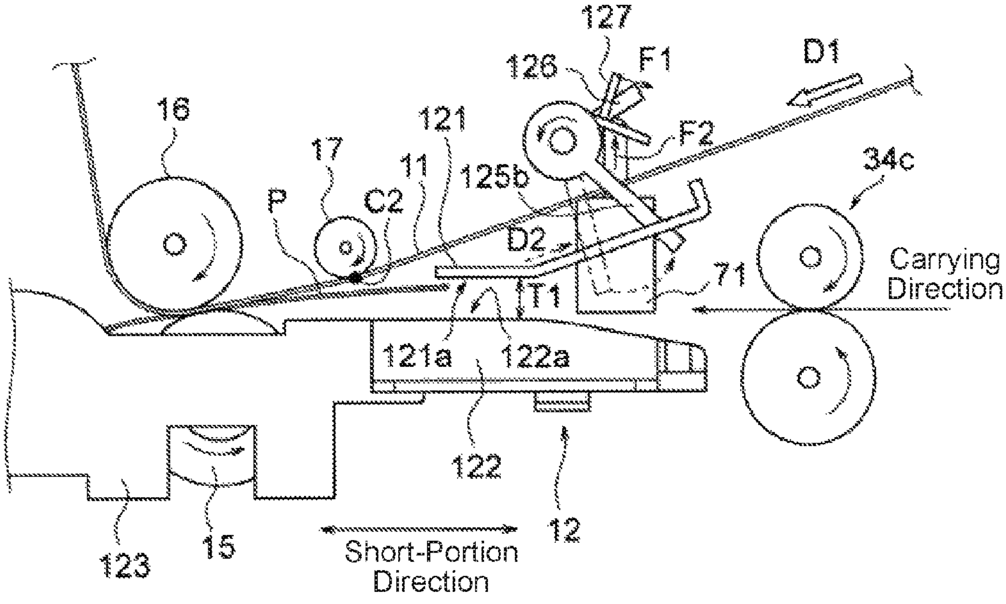


Fig. 10C

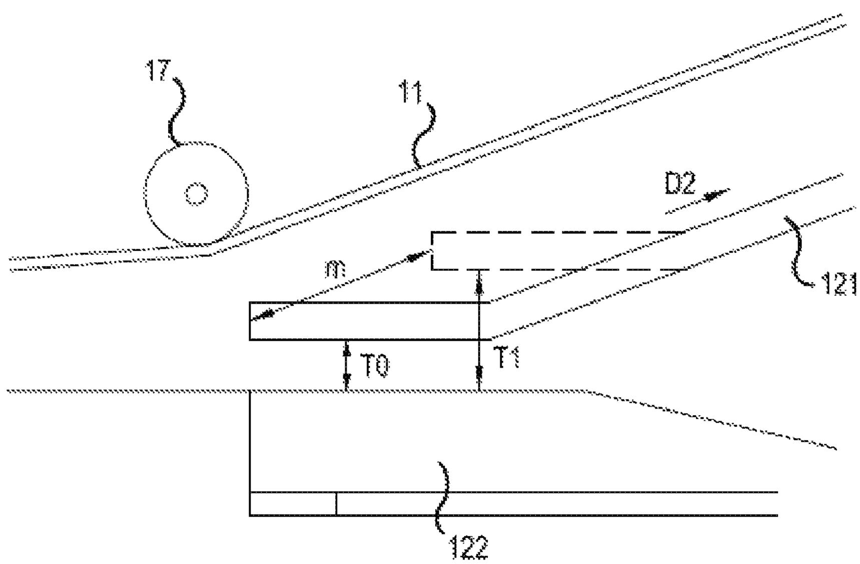


Fig. 11

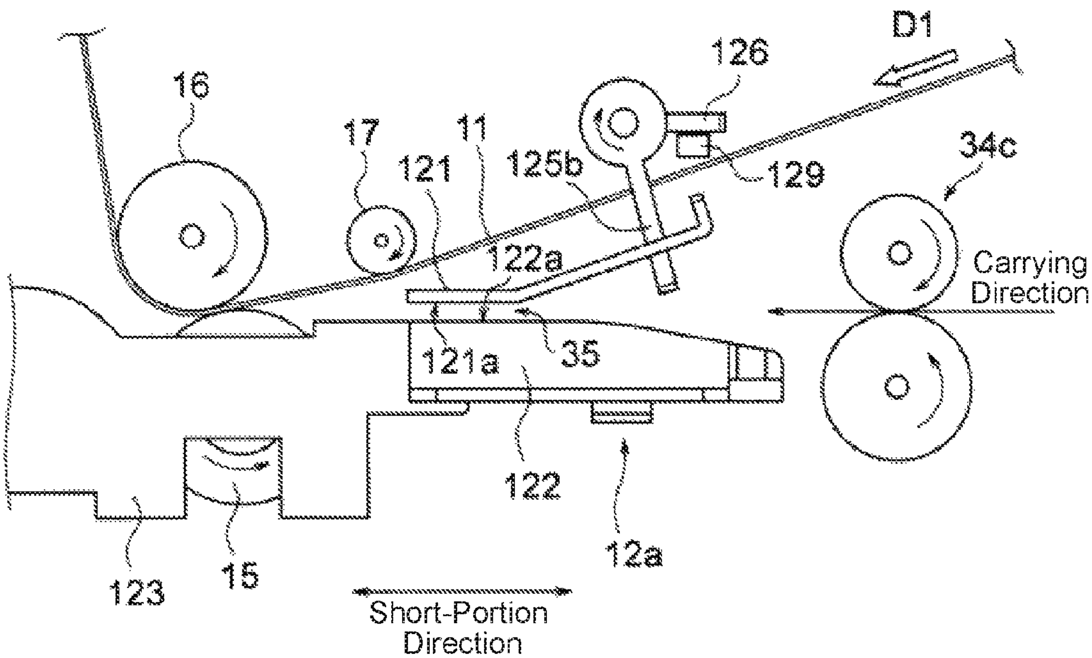

D1
126
16
17
11
121
125b
129
34c
122a
Carrying
Direction
121a
35
122
12a
123
15
Short-Portion
Direction

Fig. 12A

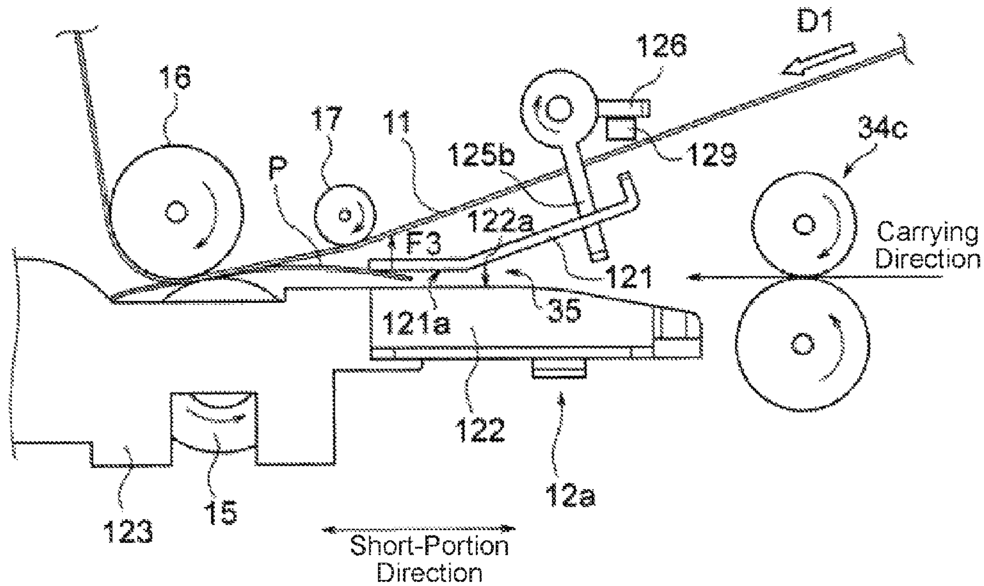


Fig. 12B

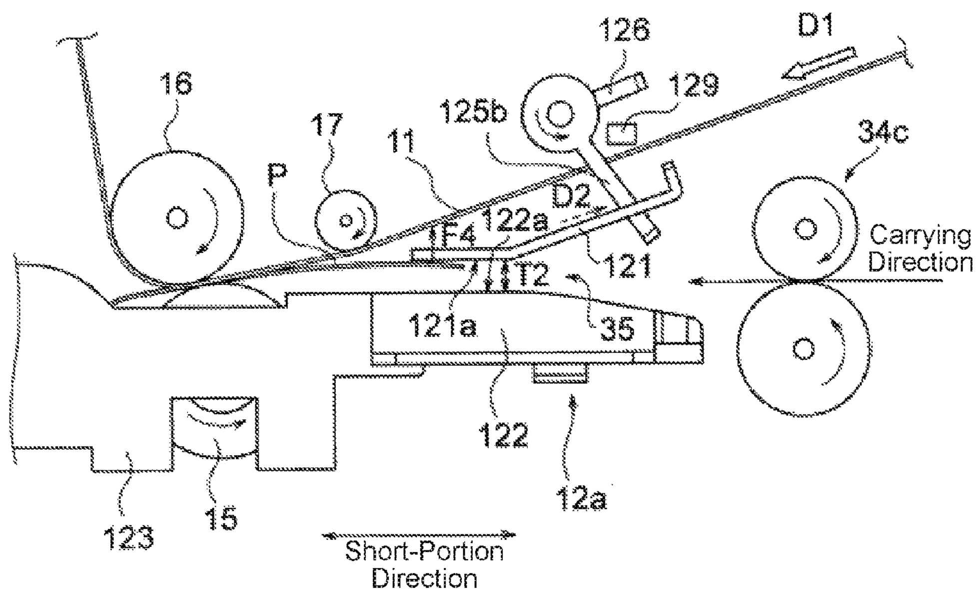


IMAGE FORMING APPARATUS

CROSS REFERENCE

The present application is related to, claims priority from and incorporates by reference Japanese Patent Application No. 2015-060616, filed on Mar. 24, 2015.

TECHNICAL FIELD

The present application relates to an image forming apparatus that forms an image on a medium.

BACKGROUND

In general, in an image forming apparatus that adopted an intermediate transfer system (a secondary transfer system), developer images carried by an intermediate transfer belt as an image carrier in a primary transfer part are transferred to a medium (a recording medium) in a secondary transfer part. The medium carried to the secondary transfer part is sometimes carried in a state where its shape is curled, and if the medium is carried to the secondary transfer part as it is in the curled state, the curled medium comes into contact with the intermediate transfer belt before the secondary transfer is executed, which induced disturbances in the developer images carried by the intermediate transfer belt in some cases. Then, in order to prevent contact between the medium and the intermediate transfer belt, an image forming apparatus that is provided with a guide part, in a position before the position where the medium enters the secondary transfer part, for appropriately guiding the medium to the secondary transfer part has been proposed (for example, see Patent Document 1).

Patent Document

Japanese Unexamined Patent Application 2011-133529

However, depending on the kind of the medium, there was a problem that when the medium passed through the guide part, the trailing edge of the medium in the carrying direction of the medium jumped up, and by the jumped-up medium contacting with the intermediate transfer belt, contact sound or disturbances in the print image occurred.

Then, an objective of the present application is to prevent the occurrence of the jump-up behavior when the medium passes through the guide part and reduce the occurrence of contact sound during the print operation and disturbances in the print image.

SUMMARY

An image forming apparatus disclosed in the application includes an image carrier that carries a developer image, a carrying part that carries a medium; and a guide part that forms a carrying path to guide the medium carried by the carrying part toward a transfer position where the developer image carried by the image carrier is transferred to the medium. The guide part is configured to change a thickness of the carrying path according to a kind of the medium.

According to the present application, because the occurrence of the jump-up behavior when the trailing edge portion of the medium passes through the guide part can be prevented, the occurrence of contact sound during the print operation and disturbances in images can be reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view showing the structure of an image forming apparatus of Embodiment 1 of the present application.

FIG. **2** is a block diagram showing a control system in the image forming apparatus.

FIG. **3** is a side view showing schematically the internal structure in the vicinity of a secondary transfer position of the image forming apparatus.

FIG. **4** is a perspective view showing the structure of one-end side in the long-portion direction of a guide part.

FIG. **5**A is a perspective view showing the whole structure excluding a supporting member inside the guide part, and FIG. **5**B is an enlarged perspective view showing the structure of one-end side (region **A1**) of the guide part shown in FIG. **5**A.

FIG. **6** is a perspective view showing the structure of one-end side in the long-portion direction of the guide part.

FIG. **7** is a perspective view showing the structure of the guide part, including the cross-sectional structure when the supporting member shown in FIG. **6** is cut along a line B**6**-B**6**.

FIG. **8**A is a front view of a first guide member, and FIG. **8**B is a plan view of the first guide member.

FIG. **9** is a cross-sectional view showing schematically the internal structure in the vicinity of the secondary transfer position the image forming apparatus.

FIGS. **10**A to **10**C are side views showing the state of the guide part before and after the movement of the first guide member.

FIG. **11** is a side view showing schematically the internal structure in the vicinity of the secondary transfer position of the image forming apparatus of Embodiment 2 of the present application.

FIGS. **12**A and **12**B are side views showing the state of the guide part before and during the movement of the first guide member included in the image forming apparatus of Embodiment 2.

DETAILED EMBODIMENTS

Embodiment 1

Configuration of the Image Forming Apparatus 100

FIG. **1** is a cross-sectional view showing the structure of an image forming apparatus **100** of Embodiment 1 of the present application. FIG. **2** is a block diagram showing a control system in the image forming apparatus **100**.

The image forming apparatus **100** is provided with a transfer belt unit **10** including an intermediate transfer belt **11** as the image carrier (developer image carrying means) that carries toner images as the developer images.

The image forming apparatus **100** is further provided with an image forming part **20** that forms toner images, a sheet feeding part **30** that feeds and carries a sheet P as the medium (recording medium) toward the image forming part **20**, a fuser part **40** that fuses the toner images formed on the sheet P, and a medium ejection part **50** that ejects the sheet P having the toner images fused to the outside of the image forming apparatus **100**.

The image forming apparatus **100** is further provided with toner cartridges **25**K, **25**C, **25**M, **25**Y, and **25**W as developer containing parts that contain toners, a controller **61** that controls individual components inside the image forming apparatus **100**, a drive unit **62** that supplies drive forces to drive individual components inside the image forming apparatus **100**, and a detection part **63** that detects the sheet P carried inside the image forming apparatus **100**.

<Configuration of the Transfer Belt Unit>

The transfer belt unit **10** is provided with the intermediate transfer belt **11** that carries toner images, and a guide part **12** that forms a carrying path **35** to guide the sheet P toward the transfer position (secondary transfer position) where the toner images carried by the intermediate transfer belt **11** are transferred to the sheet P. The "secondary transfer position" denotes the position where the toner images carried by the intermediate transfer belt **11** are transferred to the sheet P, and more specifically, the position between a secondary transfer roller **15** and a backup roller **16** mentioned below.

The transfer belt unit **10** further includes a drive roller **13** that rotationally drives the intermediate transfer belt **11** in the direction of an arrow D**1** shown in FIG. **1** (hereafter, also called the "belt carrying direction") through rotating by receiving a drive force from the drive unit **62**, a tension roller **14** that rotates driven by the rotational drive of the intermediate transfer belt **11** while stretching the intermediate transfer belt **11**, a secondary transfer roller **15** as a transfer member that is disposed in the transfer position (secondary transfer position) and transfers the toner images carried on the surface of the intermediate transfer belt **11** to the sheet P, a backup roller **16** disposed opposing the secondary transfer roller **15** across the intermediate transfer belt **11** sandwiched between them, and a support roller **17** as a stretching member that stretches the intermediate transfer belt **11** in the upstream side of the backup roller **16** in the belt carrying direction.

The transfer belt unit **10** further includes multiple primary transfer rollers **18** as the primary transfer parts disposed opposing the respective photosensitive drums **21** of the below-mentioned image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W across the intermediate transfer belt **11** sandwiched between them.

The transfer belt unit **10** can be configured detachable from the image forming apparatus **100**.

The intermediate transfer belt **11** is, for example, an endless belt. The intermediate transfer belt **11** is configured in such a manner that its surface becomes closer to a below-mentioned second guide member **122** as it moves toward the secondary transfer position.

The secondary transfer roller **15** has a secondary transfer bias applied under the control by the controller **61**, and utilizes Coulomb force to secondary-transfer the toner images on the intermediate transfer belt **11** to the sheet P.

The support roller **17** is provided in the upstream side of the secondary transfer roller **15** and the backup roller **16** in the carrying direction of the sheet P, and stretches the intermediate transfer belt **11**.

Each of the transfer rollers **18** has the primary transfer bias applied under the control by the controller **61**, and utilizes Coulomb force to primary-transfer the toner images formed in the respective image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W onto the intermediate transfer belt **11**.

<Configuration of the Image Forming Part **20**>

The image forming part **20** (toner image forming part) includes the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W that form toner images using toners of individually different colors. The image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W are arranged along the belt carrying direction (the moving direction of the intermediate transfer belt **11**). For example, the image forming unit **20**K uses a black-color toner to form images, the image forming unit **20**C uses a cyan-color toner to form images, the image forming unit **20**M uses a magenta-color toner to form images, the image forming unit **20**Y uses a yellow-color toner to form images, and the image forming unit **20**W uses a special-color toner (for example, a clear toner or a white toner) to form images. It is noted that in the image forming apparatus **100**, the colors of the toners used or the number of the image forming units are not limited to the examples shown in FIG. **1**.

The image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W are mutually different in their toners (toner colors) used and the same in the structure inside the units.

Each of the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W includes the photosensitive drum **21** as the image carrier for carrying the toner image, a charging roller **22** as a charging member that negatively charges the surface of the photosensitive drum **21**, a laser head **23** as an exposure member that radiates light onto the surface of the charged photosensitive drum **21** to form an electrostatic latent image, and a development device **24** that supplies a toner to the electrostatic latent image to form a toner image.

The photosensitive drum **21** is, for example, a cylindrical OPC (Organic Photo Conductor) drum.

The laser head **23** includes, for example, LED (Light Emitting Diode) array elements that emit laser light. The development device **24** includes, for example, a development roller for supplying a toner to the photosensitive drum **21**, and a supply roller for supplying the toner to the development roller.

The toner cartridges **25**K, **25**C, **25**M, **25**Y, and **25**W are provided with the black-color toner, the cyan-color toner, the magenta-color toner, the yellow-color toner, and the special-color toner (for example, the clear toner or the white toner), respectively, as toners for replenishment. The toner cartridges **25**K, **25**C, **25**M, **25**Y, and **25**W are detachable from the image forming apparatus **100**.

The image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W are connected respectively to the toner cartridges **25**K, **25**C, **25**M, **25**Y, and **25**W where their respective color toners used are stored, and when the toners inside the development devices **24** run short, the toners are supplied from the respective toner cartridges **25**K, **25**C, **25**M, **25**Y, and **25**W to the development devices **24**.

<Configuration of the Sheet Feeding Part **30**>

The sheet feeding part **30** includes a medium tray **31** inside which the sheets P are stacked, a pickup roller **32** that forwards the sheets P from the medium tray **31**, a feed roller **33***a* and a retard roller **33***b* as a separation roller pair that separates the sheets P forwarded by the pickup roller **32** into single pieces, carrying roller pairs **34***a*, **34***b*, and **34***c* as carrying parts that carry the sheet P toward the secondary transfer position, and a carrying path **35** through which the sheet P passes.

The sheet feeding part **30** further includes a reverse roller pair **36** for double-sided printing, and carrying roller pairs **37***a*, **37***b*, **37***c*, **37***d*, and **37***e* for carrying the sheet P with toner images fused on one side to the secondary transfer position again.

The pickup roller **32** is provided so as to press-contact with the sheet P that has risen to a certain height inside the medium tray **31**, and forwards the sheet P through rotating by receiving a drive force from the drive unit **62**.

<Configuration of the Fuser Part **40**>

The fuser part **40** comprises a heater **41** that becomes a heat source, a fuser roller **42** (upper roller) whose surface is formed of an elastic body, and a backup roller **43** (lower roller) that pressurizes toner images on the sheet P together with the fuser roller **42**.

<Configuration of the Medium Ejection Part **50**>

The medium ejection part **50** includes ejection roller pairs **51**a, **51**b, **51**c, **51**d, and **51**e that carry the sheet P having the toner images fused in the fuser part **40**, and a stacker part **52** where the sheets P ejected by the ejection roller pair **51**e are stacked.

<Configuration of the Control System>

When the print command is received from a host device, the controller **61** controls the drive unit **62** to drive individual components inside the image forming apparatus **100**. For example, the controller **61** can send a control signal to a roller drive part **62**a to rotate the individual rollers inside the image forming apparatus **100** by a drive source (for example, a motor) and a drive mechanism (for example, a gear) included in the roller drive part **62**a.

Also, when the print command is received from the host device, the controller **61** controls the transfer belt unit **10**, the image forming part **20**, and the fuser part **40** to execute an image forming process. For example, the controller **61** controls biases applied to the primary transfer rollers **18**, the secondary transfer roller **15**, the charging rollers **22**, and the development devices **24**. Also, the controller **61** controls the laser heads **23** to have the laser heads **23** emit laser light that corresponds to the image data included in the print command. Also, the controller **61** controls heating by the heater **41** of the fuser part **40**.

The drive unit **62** includes the roller drive part **62**a as a roller drive means, and a guide drive part **62**b as a guide drive means. The roller drive part **62**a includes a drive source such as a motor and a drive mechanism such as a gear, and when a control signal is received from the controller **61**, can rotate the photosensitive drums **21** and the individual rollers. The guide drive part **62**b includes an actuator **71** (for example, a linear actuator) as the drive source, and can supply a drive force for moving a first guide member **121** to the guide part **12**.

The detection part **63** includes a first medium sensor **63**a (paper thickness sensor) as a first medium detection part that detects the kind (for example, the thickness) of sheet P, a second medium sensor **63**b as a second medium detection part that detects the presence of the sheet P, and a third medium sensor **63**c as a third medium detection part that detects the presence of the sheet P.

The first medium sensor **63**a is provided in the vicinity of the carrying roller pair **34**c, and can detect the thickness (paper thickness) of the sheet P when the sheet P passes through the carrying roller pair **34**c. It is noted that the first medium sensor **63**a can be provided in an arbitrary place in the carrying path (including the carrying path **35**) that connects the medium tray **31** and the guide part **12**. When the sheet P passes through the carrying roller pair **34**c, other than detecting the thickness (paper thickness) of the sheet P, the first medium sensor **63**a can also detect the passage of the sheet P through the carrying roller pair **34**c.

The second medium sensor **63**b is provided in the downstream side of the secondary transfer roller **15** in the carrying direction of the sheet P, and can detect the passage of the sheet P. For example, by the second medium sensor **63**b detecting the trailing edge portion of the sheet P in the carrying direction of the sheet P, the passage of the sheet P through the secondary transfer position can be detected.

The third medium sensor **63**c is provided in the downstream side of the fuser part **40** in the carrying direction of the sheet P, and can detect the passage of the sheet P. For example, by the third medium sensor **63**c detecting the trailing edge portion of the sheet P in the carrying direction of the sheet P, the passage of the sheet P through the fuser part **40** can be detected.

When the presence of the sheet P is detected, the first medium sensor **63**a, the second medium sensor **63**b, and the third medium sensor **63**c send the detection results to the controller **61**. The first medium sensor **63**a is a sensor that can detect the thickness of the sheet P, and upon detecting the thickness of the sheet P, sends the detection result to the controller **61**.

<Configuration of the Guide Part **12**>

FIG. **3** is a side view showing schematically the internal structure of the image forming apparatus **100** in the vicinity of the secondary transfer position. As shown in FIG. **3**, in this specification, the "short-portion direction" indicates the direction that is parallel to the carrying direction of the sheet P.

FIG. **4** is a perspective view showing the structure of one-end side in the long-portion direction of the guide part **12**. As shown in FIG. **4**, in this specification, the "long-portion direction" is the direction that is perpendicular to the short-portion direction and parallel to the rotation axis of a drive shaft **124**. The guide part **12** shown in FIG. **4** is the structure viewed from the upstream side in the carrying direction of the sheet P, and shows the structure of only one-end side in the long-portion direction. The guide part **12** can be given the same structure for the other-end side that is not shown in FIG. **4**. It is noted that the other-end side of the guide part **12** can be given a structure that is not provided with the actuator **71**, a second lever **126**, or a spring **127** mentioned below.

FIG. **5**A is a perspective view showing the whole structure excluding the supporting member **123** inside the guide part **12**, and FIG. **5**B is an enlarged perspective view showing the structure of one-end side (region A**1**) of the guide part **12** shown in FIG. **5**A.

The guide part **12** is configured in such a manner that the thickness of the carrying path **35** formed by the first guide member **121** changes according to the kind (for example, the thickness) of the sheet P. Specifically, the guide part **12** is configured in such a manner that the thickness of the carrying path **35** is changed by the first guide member **121** moving according to the thickness of the sheet P. The "thickness of the carrying path **35** formed by the first guide member **121**" (hereafter called the "thickness of the carrying path **35**") is the distance between the first guide face **121**a forming the wall face on the side of the carrying path **35** of the first guide member **121** and the second guide face **122**a forming the wall face on the side of the carrying path **35** of the second guide member **122**.

An example of the specific configuration of the guide part **12** is explained. As shown in FIG. **3**, the guide part **12** includes the first guide member **121** that forms one wall face in the thickness direction of the carrying path **35**, the second guide member **122** that opposes the wall face (first guide face **121**a) of the carrying path **35** formed by the first guide member **121** and forms the other wall face (second guide face **122**a) in the thickness direction of the carrying path **35**, and the supporting member **123** that movably supports the first guide member **121**.

As shown in FIGS. **3**, **4**, **5**A, and **5**B, the guide part **12** further includes the drive shaft **124** that is rotatably supported by the supporting member **123**, the first levers **125**a and **125**b that are supported by the drive shaft **124** and move the first guide member **121**, the second lever **126** that is supported at an end of the drive shaft **124** and rotates the drive shaft **124** and the first levers **125**a and **125**b by receiving a drive force from the actuator **71**, the spring **127** that is provided at an end of the drive shaft **124** and biases the first guide member **121** toward the normal guide position through the drive shaft **124** and the first levers **125***a* and **125***b*, a bearing **128** that is provided inside the supporting member **123** and rotatably holds the drive shaft **124**, and a stopper part **129** that restricts the amount of movement (amount of rotation) of the second lever **126**.

The "normal guide position" denotes the position where the first guide member **121** rests in a state before starting a movement as shown in FIG. **3**. In other words, the "normal guide position" denotes the position were the first guide member **121** rests because the rotation of the second lever **126** is restricted by the stopper part **129**. Usually, when plain paper is used as the sheet P, the guide part **12** guides the sheet P to the secondary transfer position in a state where the first guide member **121** rests in the normal guide position.

In this specification, the "plain paper" denotes a sheet whose basis weight (g/m^2) is less than 200 g/m^2, such as Excellent White A**4** (basis weight 80 g/m^2) manufactured by Oki Data Corporation. In the image forming apparatus **100** of Embodiment 1, the sheet P of about 100 g/m^2 in basis weight is usually used as the plain paper.

As shown in FIG. **5**B, the drive shaft **124** is rotatably held by the bearing **128**.

FIG. **6** is a perspective view showing the structure of one-end side in the long-portion direction of the guide part **12**. The guide part **12** shown in FIG. **6** is the structure viewed from the upstream side in the carrying direction of the sheet P, and shows the structure of only one-end side in the long-portion direction.

FIG. **7** is a perspective view showing the structure of the guide part **12**, including the cross-sectional structure when the supporting member **123** is cut along a line B**6**-B**6** shown in FIG. **6**. Shaded areas shown in FIG. **7** indicate the cross section when the supporting member **123** is cut along the line B**6**-B**6**.

FIG. **8**A is a front view of the first guide member **121**, and FIG. **8**B is a plan view of the first guide part **121**.

As shown in FIGS. **6**, **7**, and **8**, the first guide member **121** includes the first guide face **121***a* forming the wall face of the carrying path **35** over the long-portion direction of the first guide member **121**, slide parts **121***b* provided on both-end sides in the long-portion direction of the first guide member **121**, long holes **121***c* provided on both-end sides in the long-portion direction of the first guide member **121**, and multiple fitting parts **121***d* in a square hole shape provided on both-end sides in the long-portion direction of the first guide member **121**. The long holes **121***c* have a long shape in a direction perpendicular to the long-portion direction.

The first guide face **121***a* forms the carrying path **35** by forming the wall face of the first guide member **121** opposing the second guide member **122** (specifically, the second guide face **122***a*). Also, the first guide face **121***a* guides the sheet P carried up by the carrying roller pair **34***c* to the secondary transfer position without having it contact with the intermediate transfer belt **11**.

The second guide member **122** forms the carrying path **35** by forming the wall face of the second guide member **122** opposing the first guide member **121** (specifically, the first guide face **121***a*). Also, the second guide face **122***a* guides the sheet P carried up by the carrying roller pair **34***c* to the secondary transfer position.

The first guide face **121***a* and the second guide face **122***a* form the carrying path **35**, through which the sheet P passes.

As shown in FIG. **7**, the supporting member **123** includes a restriction part **123***a* that engages with one of the long holes **121***c* of the first guide member **121**, and a slide face **123***b* that supports the first guide member **121** movably in parallel to a portion of the surface of the intermediate transfer belt **11** opposing the second guide member **122**.

The first guide member **121** has the slide parts **121***b* provided on both-end sides in the long-portion direction supported by the supporting member **123** slidably on the slide face **123***b* of the supporting member **123**.

The restriction part **123***a* restricts the amount of movement of the first guide member **121**. Specifically, if the first guide member **121** slides by a specified distance in a direction perpendicular to the long-portion direction, by the inner wall of one of the long holes **121***c* contacting with the restriction part **123***a*, the movement of the first guide member **121** is restricted.

The first levers **125***a* and **125***b* are each provided on both sides in the long-portion direction of the drive shaft **124** so as to sandwich the sheet P. That is, the first levers **125***a* and **125***b* are each provided on both sides in the long-portion direction of the drive shaft **124** with a wider interval than the maximum width of the sheet P. The first levers **125***a* and **125***b* are rotatable in their state provided to the drive shaft **124**. Specifically, because an end of each of the first levers **125***a* and **125***b* is fixed to the drive shaft **124**, by the drive shaft **124** rotating, the first levers **125***a* and **125***b* can rotate together with the drive shaft **124**.

Because the tip parts of the first levers **125***a* and **125***b* are respectively fitted with the fitting parts **121***d* provided on both sides in the long-portion direction of the first guide member **121**, by rotating the first levers **125***a* and **125***b*, the first guide member **121** can be moved (let slide).

The second lever **126** is rotatable in its state provided to the drive shaft **124**. Specifically, because the second lever **126** is fixed to the drive shaft **124**, by receiving a drive force from the actuator **71**, it can rotate together with the drive shaft **124**. By the second lever **126** rotating together with the drive shaft **124** by receiving the drive force from the actuator **71**, the first levers **125***a* and **125***b* rotate together with the drive shaft **124**, and the first guide member **121** slides from the normal guide position.

The spring **127** constantly gives a bias force F**1** (that is, a torque to the drive shaft **124**) to the first guide member through the drive shaft **124** and the first levers **125***a* and **125***b* in the direction to return the first guide member **121** to the normal guide position. By making a drive force F**2** of the actuator **71** greater than the bias force F**1** by the spring **127**, the first guide member **121** can be let slide.

If driving the actuator **71** is stopped, the second lever **126** loses the drive force F**2** received from the actuator **71**. Because the spring **127** constantly biases the first guide member **121** toward the normal guide position through the drive shaft **124** and the first levers **125***a* and **125***b*, if driving the actuator **71** is stopped, the first guide member **121** returns to the normal guide position. The stopper part **129** is provided in a position in contact with the second lever **126** in such a manner that the first guide member **121** rests in the normal guide position. That is, when driving the actuator **71** is stopped, by the bias force F**1** of the spring **127** the second lever **126** rotates by a specified amount together with the drive shaft **124**, the second lever **126** comes into contact with the stopper part **129**, and the rotations of the second lever **126** and the drive shaft **124** stop.

The actuator **71** is not limited to the configuration that it is provided outside the transfer belt unit **10**. For example, it may be configured in such a manner that the actuator **71** is provided inside the transfer belt unit **10**.

FIG. 9 is a cross-sectional view showing schematically the internal structure of the image forming apparatus **100** in the vicinity of the secondary transfer position. The distance L**1** in the short-portion direction between the rotation axis of the secondary transfer roller **15** and the rotation axis of the backup roller **16** is, for example, 5.9 mm. The distance L**2** in a direction perpendicular to the short-portion direction between the rotation axis of the secondary transfer roller **15** and the rotation axis of the backup roller **16** is, for example, 19.8 mm. The distance L**3** in the short-portion direction between the rotation axis of the backup roller **16** and the rotation axis of the support roller **17** is, for example, 22.9 mm. The distance L**4** in the short-portion direction between the rotation axis of the support roller **17** and a tip C**3** of the first guide member **121** is, for example, 2.5 mm. The distance L**5** in the short-portion direction between the contact point C**2** between the support roller **17** and the intermediate transfer belt **11** and a tip C**3** of the first guide member **121** is, for example, 2.7 mm.

A first angle θ_1 that is an angle formed by a line Z**1** passing through the contact point C**1** between the secondary transfer roller **15** and the backup roller **16** and the contact point C**2** between the support roller **17** and the intermediate transfer belt **11** and the first guide face **121***a* is, for example, 11.1°. A second angle θ_2 that is an angle formed by the surface of the intermediate transfer belt **11** in the upstream side of the support roller **17** in the belt carrying direction within the intermediate transfer belt **11** and the first guide face **121***a* is, for example, 18.9°.

The distances L**1**-L**5** and angles θ_1 and θ_2 vary depending on a type of medium. Especially, the distance L**1** largely contributes the transfer performance (degree of developer transferring) of the apparatus. The angle θ_1 is equal to or above zero, largely contributing the transfer performance as well. Smaller angle θ_1 realizes larger transfer performance. Since preferred ranges of the distance L**1** and angle θ_1, they are determined in consideration of each other.

The diameter of the secondary transfer roller **15** is, for example, 24 mm. The diameter of the backup roller **16** is, for example, 18 mm. The diameter of the support roller **17** is, for example, 8 mm.

<Basic Operation of the Image Forming Apparatus **100**>

Next, the basic operation of the image forming apparatus **100** is explained. FIGS. **10**A and **10**B are side views showing the state of the guide part **12** before and after the movement of the first guide member **121**. The guide part **12** shown in FIG. **10**A is in a state where the first guide member **121** rests in the normal guide position. The guide part **12** shown in FIG. **10**B is in a state where the movement of the first guide member **121** is complete, driven by the actuator **71**.

When the print command (including image data) is input to the controller **61** of the image forming apparatus **100** from the host device such as an external computer, the controller **61** sends a control signal based on the print command to the roller drive part **62***a*, and the photosensitive drum **21** in each of the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W and the drive roller **13** rotate to start an image formation in each of the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W. Besides, although the image forming units used differ sometimes depending on the image data, because the operations are mutually the same in the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W, as for the operations in the image forming units, the operation of one of the image forming units is explained as an example below.

When image data based on the print command are sent to the controller **61**, the controller **61** sends a control signal corresponding to the image data to the laser head **23**.

To the charging roller **22** a specified charging bias applied, and the surface of the photosensitive drum **21** is uniformly charged by the charging roller **22**.

The laser head **23** irradiates the uniformly-charged surface of the photosensitive drum **21** with light corresponding to the image data to form an electrostatic latent image.

The development device **24** supplies a developer onto the surface of the photosensitive drum **21**, where the electrostatic latent image is formed, to form a toner image based on the electrostatic latent image.

Individual toner images formed in the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W are sequentially transferred so as to be superimposed on the surface of the intermediate transfer belt **11** by the primary transfer rollers **18** provided opposing the respective image forming units.

The image formation is started in each of the image forming units **20**K, **20**C, **20**M, **20**Y, and **20**W, after a specified period of time has passed, the roller drive part **62***a* rotates the pickup roller **32**, the pickup roller **32** forwards the sheets P, the sheets P are separated into single pieces by the feed roller **33***a* and the retard roller **33***b*, and the sheet P is carried by the carrying roller pairs **34***a* and **34***b* toward the secondary transfer position.

In the vicinity of the carrying roller pair **34***c*, the first medium sensor **63***a* is provided. When the leading edge portion of the sheet P in the carrying direction of the sheet P has passed through the first medium sensor **63***a*, the first medium sensor **63***a* detects the passage of the leading edge portion of the sheet P. Upon detecting the passage of the leading edge portion of the sheet P, the first medium sensor **63***a* sends the detection result to the controller **61**.

Also, the first medium sensor **63***a* detects the thickness of the sheet P when the sheet P passes through the first medium sensor **63***a*. Upon detecting the thickness of the sheet P, the first medium sensor **63***a* sends the detection result to the controller **61**.

The controller **61** judges whether the thickness of the sheet P exceeds a specified threshold value or not. As the threshold value, for example, the basis weight (g/m^2) of the sheet P can be used, such as 200 g/m^2. If the detection result of the thickness of the sheet P by the first medium sensor **63***a* does not exceed the specified threshold value, the controller **61** judges that the sheet P is a medium (for example, plain paper) that does not require the first guide member **121** to be moved, and does not move the first guide member **121** as shown in FIG. **10**A. It is noted that the threshold value is not limited to the case of 200 g/m^2 in basis weight but may be set to another value.

As shown in FIG. **10**A, the sheet P passes through the carrying path **35** and is carried to the secondary transfer position by the carrying roller pair **34***c*. If the sheet P is plain paper, in order to have the sheet P appropriately enter the secondary transfer position, the thickness of the carrying path **35** should desirably be small. If the sheet P is plain paper and the first guide member **121** is not moved, the thickness of the carrying path **35** is, for example, 2 mm.

In the example shown in FIG. **10**A, although the sheet P passes through the first guide member **121** guided by the first guide member **121** while the trailing edge portion of the sheet P is contacting with the first guide member **121**, no jump-up behavior of the trailing edge portion of the sheet P occurs.

To the secondary transfer roller **15** a transfer voltage is applied, and when the sheet P reaches the secondary transfer position, the toner images carried on the surface of the intermediate transfer belt **11** are transferred to the sheet P. Once the toner images are transferred to the sheet P in the secondary transfer position, the sheet P reaches the fuser part **40**.

When the sheet P, to which the toner images transferred, is carried to the fuser part **40** and passes between the fuser roller **42** and the backup roller **43**, heat and pressure are applied to the sheet P to fuse the toner images on the sheet P.

The sheet P, to which the toner images are fused, is ejected by the ejection roller pairs **51***a*, **51***b*, **51***c*, **51***d*, and **51***e* to the outside of the image forming apparatus **100**.

<Operation of the Guide Part **12**>

Next, the operation of the guide part **12** (the operation when the first guide member **21** is moved) is explained based on FIG. **10**B.

In the print operation of the image forming apparatus **100**, when the sheet P passes through the first medium sensor **63***a*, the thickness of the sheet P is detected. If the detection result of the thickness of the sheet P by the first medium sensor **63***a* exceeds a specified threshold value, the controller **61** judges that the sheet P is special paper (for example, thick paper) as a medium that requires the first guide member **121** to be moved, sends a control signal for moving the first guide member **121** to the drive unit **62** (specifically, the guide drive part **62***b*) to control the drive unit **62** (specifically, the guide drive part **62***b*).

As the threshold value, for example, the basis weight (g/m^2) of the sheet P can be used, such as 200 g/m^2. Note that the threshold value is not limited to 200 g/m^2 in basis weight but may be set to another value.

In this specification, "thick paper" denotes a sheet of 200 g/m^2 or more in basis weight (g/m^2). In this specification, "special paper" also includes, other than thick paper, media that are less than 200 g/m^2 in basis weight and have high rigidity, and media that are less than 200 g/m^2 in basis weight and have a large elastic force. Examples of "special paper" are film media, label media, envelopes, postcards, embossed paper, and the like.

For example, paper having longitudinal rigidity less than 4500 N/mm^2 may be regarded as the special paper. In a case where the media that are less than 200 g/m^2, the media are determined as the special paper in the basis of print result, for example, a status or condition of the trailing edge. The operator may input manually a temperature for fusing, a type of medium etc via an input device. Alternatively, the determination may be made by using various sensors, such as an optical sensors to detect the status or condition of the trailing edge of media.

Upon receiving a control signal from the controller **61** for moving the first guide member **121**, the guide drive part **62***b* drives the actuator **71** as shown in FIG. **10**B to rotate the second lever **126** by the drive force F**2** in the linear direction, which rotates the drive shaft **124**.

Because the first levers **125***a* and **125***b* are respectively fitted with the fitting parts **121***d* provided on both sides in the long-portion direction of the first guide member **121**, by the first levers **125***a* and **125***b* rotating together with the drive shaft **124**, the first guide member **121** slides in parallel with the surface of the intermediate transfer belt **11** (in the direction of an arrow D2 shown in FIG. **10**B) while being supported by the slide face **123***b*. When the first guide member **121** slides, the amounts of movement (linear distances) of the tip parts of the first levers **125***a* and **125***b* fitted with the fitting parts **121***d* are, for example, 9 mm, respectively.

As shown in FIG. **10**B, when the first guide member **121** slides, the first guide member **121** moves in such a manner that the thickness T**1** of the carrying path **35** becomes larger than the distance between the contact point C**2** between the support roller **17** and the intermediate transfer belt **11** and the surface of the second guide member **122** (second guide face **122***a*), and moves to the position where the trailing edge portion in the carrying direction of the sheet P does not contact with the first guide member **121**. The leading edge oriented toward the carrying direction of the first guide member **121** should desirably move to a higher position than the lower end of the support roller **17**, and the thickness T**1** of the carrying path **35** is, for example, 5 mm. The thickness T**1** is preferably larger than the thickness of the sheet P by 0.5 mm or more. In addition, to increase the thickness of the carrying path **35** to T**1**, the first guide member **12** needs to be moved in the direction parallel with the surface of the intermediate transfer belt **11** (in the direction of an arrow D2 shown in FIG. **10**C) by an amount of movement m. The amount of movement m can be determined from the following equation:

$$m=(T1-T0)/\sin\theta 2$$

where T**0** is the normal thickness of the carrying path **35** (i.e., a distance between the first guide member **121** and the second guide member **122** at the time when the first guide member **121** is at the normal guide position) (see FIG. **10**A).

The timing of moving the first guide member **121** can be arbitrarily set. It is noted that when the first guide member **121** slides, the first guide member **121** should desirably separate from the sheet P after the leading edge portion of the sheet P in the carrying direction of the sheet P passed through the tip part of the first guide member **121** oriented toward the carrying direction and before the trailing edge portion of the sheet P in the carrying direction passes through the tip part of the first guide member **121**.

Also, it may be configured in such a manner that when the detection result by the first medium sensor **63***a* has exceeded the specified threshold value (that is, when the controller **61** has judged that the first guide member **121** is required to be moved), the controller **61** controls the drive unit **62** (specifically, the guide drive part **62***b*) to move the first guide member **121** at the timing when the second medium sensor **63***b* has detected the presence of the sheet P.

Also, it may be configured in such a manner that when the detection result by the first medium sensor **63***a* has exceeded the specified threshold value, the first guide member **121** is moved after a specified period of time has passed since the time when the first medium sensor **63***a* detected the thickness of the sheet P. The specified period may be defined as a timing before the trailing edge of the sheet P, which is assigned to be printed, in the longitudinal direction reaches an upstream side (or sheet feeding side) of the guide member **2**.

Also, it may be configured in such a manner that when the detection result by the first medium sensor **63***a* has exceeded the specified threshold value, the first guide member **121** is moved at the timing when the leading edge portion of the sheet P has reached between the secondary transfer roller **15** and the backup roller **16**.

At the timing when the trailing edge of the sheet P has passed through the secondary transfer roller **15**, driving the actuator **71** is stopped, the drive force received by the second lever **126** from the actuator **71** is released, and the first guide member **121** returns to the normal guide position and rests by the bias force F**1** of the spring **127**.

Besides, by the second medium sensor **63***b* or the third medium sensor **63***c* detecting the passage of the trailing edge of the sheet P, the controller **61** can judge that the sheet P has passed through the secondary transfer position. By the third medium sensor **63***c* detecting the passage of the trailing edge of the sheet P, the controller **61** can judge that the sheet P has passed through the fuser part **40**.

Although in the example explained above, a case where the sheet P requiring the first guide member **121** to be moved was thick paper was explained as an example, the image forming apparatus **100** explained in Embodiment 1 can also be applied to other special paper, for example, media that are less than 200 g/m^2 in basis weight (g/m^2) and have high rigidity. In this case, for example, by presetting the print mode of the image forming apparatus **100** to a print mode where the first guide member **121** is moved at a specified timing, even when printing onto a medium of high rigidity, the occurrence of the jump-up behavior of the training edge of the sheet P can be prevented regardless of the thickness of the sheet P.

According to Embodiment 1, by configuring the guide member **12** in such a manner that the first guide member **121** moves according to the kind (for example, the thickness) of the sheet P to change the thickness of the carrying path **35**, the occurrence of the jump-up behavior when the trailing edge portion of the sheet P passes through the first guide member **121** can be prevented, thereby the occurrence of contact sound during the print operation and disturbances in the print image can be reduced.

When the first guide member **121** slides, by the first guide member **121** separating from the sheet P after the leading edge portion of the sheet P in the carrying direction of the sheet P (thick paper) passed through the tip part of the first guide member **121** oriented toward the carrying direction and before the trailing edge portion of the sheet P in the carrying direction passes through the tip part of the first guide member **121**, even if the sheet P is carried up to the secondary transfer position in a curled state, the leading edge portion of the sheet P can be guided to the secondary transfer position by the first guide member **121** without contacting with the surface of the intermediate transfer belt **11**, thereby the occurrence of the jump-up behavior of the trailing edge of the sheet P can be prevented.

When the first guide member **121** slides, by moving the first guide member **121** in such a manner that the thickness of the carrying path **35** becomes larger than the distance between the contact point C**2** between the support roller **17** and the intermediate transfer belt **11** and the surface of the second guide member **122** (the second guide face **122***a*), the occurrence of the jump-up behavior of the trailing edge of the sheet P can be prevented even more efficiently.

By having the support roller **17** contact with the intermediate transfer belt **11** in the upstream side of the second transfer roller **15** in the carrying direction of the sheet P to stretch the intermediate transfer belt **11**, the second angle θ_2 can be made greater than the first angle θ_1, thereby a space for moving the first guide member **121** in parallel with the surface of the intermediate transfer belt **11** can be formed.

Also, by adopting a configuration that the first guide member **121** of the guide part **12** is moved, there is no need to move the secondary transfer roller **15**.

Embodiment 2

FIG. **11** is a side view showing schematically the internal structure of the image forming apparatus of Embodiment 2 of the present application in the vicinity of the secondary transfer position.

The image forming apparatus of Embodiment 2 is different from the image forming apparatus **100** of Embodiment 1 in that the actuator **71** and the spring **127** explained in Embodiment 1 are not provided, and is the same as the image forming apparatus **100** of Embodiment 1 in other respects. Therefore, for the components in the image forming apparatus of Embodiment 2, those components that are identical or correspond to the components in the image forming apparatus **100** of Embodiment 1 will be explained using the same codes as the components in the image forming apparatus **100** of Embodiment 1.

The guide part **12***a* shown in FIG. **11** is in a state before the first guide member **121** moves, that is, a state where the first guide member **121** rests in the normal guide position. Specifically, although the first guide member **121** tries to move (slide) to narrow the thickness of the carrying path **35** by its own weight, by the second lever **126** contacting with the stopper part **129**, the first guide member **121** rests in the normal guide position. Under the condition using a plain sheet having an A4 width (210 mm, cc200), the resilience force by the sheet is approximately 0.43 kgf.

FIGS. **12**A and **12**B are side views showing the states of the guide part **12***a* before and during the movement of the first guide member **121** included in the image forming apparatus of Embodiment 2, respectively. FIG. **12**A shows the state of the guide part **12***a* when plain paper is used as the sheet P, and FIG. **12**B shows the state of the guide part **12***a* when special paper is used as the sheet P.

The guide part **12***a* shown in FIG. **12**A is in a state where the first guide member **121** rests in the normal guide position. As shown in FIG. **12**A, in the print operation of the image forming apparatus, the sheet P carried up by the carrying roller pair **34***c* enters between the first guide member **121** and the second guide member **122**.

When the sheet P is plain paper, because a force F**3** given to the first guide member **121** by the sheet P is weak, the first guide member **121** guides the sheet P to the secondary transfer position without moving (sliding).

Also, when the sheet P is plain paper, even if the trailing edge portion of the sheet P in the carrying direction of the sheet P passes through the carrying path **35** while contacting with the first guide member **121**, the jump-up behavior of the trailing edge of the sheet P does not occur. It is noted that when the sheet P is plain paper, the sheet P may sometimes enter the secondary transfer position without any contact between the sheet P and the first guide member **121**.

On the other hand, as shown in FIG. **12**B, when the sheet P is special paper and a force F**4** given to the first guide member **121** by the elasticity of the sheet P is greater than the force by the own weight of the first guide member **121**, by receiving the force F**4** given by the sheet P, the first guide member **121** slides in the a direction parallel to the surface of the intermediate transfer belt **11** (the direction of an arrow D2 shown in FIG. **12**B) by the amount of movement m while being supported by the slide face **123***b*. That is, the drive force that moves the first guide member **121** is given by the sheet P that passes while contacting with the first guide member **121**.

The first guide member **121** of the guide part **12***a* slides as shown in FIG. **12**B without detecting the kind (for example, the thickness) of the sheet P by the first medium sensor **63***a* when the force F**4** given to the first guide member **121** by the elasticity of the sheet P is greater than the force by the own weight of the first guide member **121**.

In the embodiment, the force F**3** (linear pressure) by the plain paper is preferably less than 20 N/m. For force F**4**, it is preferred to use a medium that generates a linear pressure of 20 N/m or more.

As shown in FIG. **12**B, when the sheet P is special paper, the sheet P passes through the first guide member **121** while the trailing edge portion of the sheet P moves the first guide member **121**. Therefore, by the first guide member **121** sliding while receiving the force F**4** given by the sheet P, the guide part **12***a* changes the thickness of the carrying path **35** and absorbs the force F**4** given by the sheet P. By the first guide member **121** gradually absorbing the force F**4** of the sheet P while sliding, even if the trailing edge portion of the sheet P is in contact with the first guide member **121** (specifically, the first guide face **121***a*) when the trailing edge portion of the sheet P passes through the first guide member **121**, the jump-up behavior of the trailing edge of the sheet P can be eased.

When the sheet P is special paper, the thickness T**2** of the carrying path **35** when the trailing edge portion of the sheet P has passed through the first guide member **121** while moving the first guide member **121** should preferably be 5 mm or less. It is noted that it may be configured in such a manner that the thickness T**2** of the carrying path **35** becomes an appropriate thickness according to the thickness, elastic force, etc. of the sheet P.

In the image forming apparatus of Embodiment 2, the occurrence of the jump-up behavior of the trailing edge of the sheet P can be prevented without using the first medium sensor for performing the judgment whether to move the first guide member **121** of the guide part **12***a*, or the second medium sensor **63***b* and the third medium sensor **63***c* for determining the timing to move the first guide member **121**. It is noted that for grasping the position of the sheet P inside the image forming apparatus, the first medium sensor **63***a*, the second medium sensor **63***b*, or the third medium sensor **63***c* may be used.

According to Embodiment 2, the occurrence of the jump-up behavior when the trailing edge portion of the sheet P passes through the first guide member **121** can be prevented by configuring the guide part **12***a* in such a manner that the thickness of the carrying part **35** is changed by the first guide member **121** moving according to the kind of the sheet P (for example, thick paper, a medium having a large elastic force, a medium with high rigidity, etc.), thereby the occurrence of contact sound during the print operation and disturbances in images can be reduced.

Also, according to Embodiment 2, because the drive force that moves the first guide member **121** is given by the sheet P that passes while contacting with the first guide member **121**, the first guide member **121** can be moved according to the kind of the sheet P without using a drive part for moving the first guide member **121**.

Although configurations provided with the guide parts **12** and **12***a* in the transfer belt unit **10** were explained as examples in the embodiments explained above, the configurations of the guide parts **12** and **12***a* are not limited to the configuration that they are provided to the transfer belt unit **10**. For example, the guide parts **12** and **12***a* may be configured in such a manner that they are fixed to the inner wall of the chassis of the image forming apparatus.

The configurations explained in the embodiments explained above can also be applied to multifunction printers, facsimile machines, multifunction machines, or photocopiers.

What is claimed is:

1. An image forming apparatus, comprising:

an intermediate transfer belt that carries a developer image;

a carrying part that carries a medium; and

a guide part that forms a carrying path to guide the medium carried by the carrying part toward a transfer position where the developer image carried by the intermediate transfer belt is transferred to the medium, wherein

the guide part includes

a first guide member that forms a first guide surface of the carrying path,

a second guide member that is opposed from the first guide surface, forms a second guide surface of the carrying path,

the first guide member moves along the intermediate transfer belt, in a direction reverse to a belt carrying direction of a part of the intermediate transfer belt opposed from the second guide member.

2. The image forming apparatus according to claim **1**, wherein

the guide part includes

a supporting member that movably supports the first guide member.

3. The image forming apparatus according to claim **2**, wherein

the intermediate transfer belt is configured in such a manner that an image carrying surface of the intermediate transfer belt approaches closer to the second guide member as the intermediate transfer belt moves toward the transfer position, and

the supporting member includes a slide surface that supports the first guide member movably in a direction parallel to a portion of the surface of the image carrier facing the second guide member.

4. The image forming apparatus according to claim **1**, wherein

the first guide member includes a tip part of the first guide member oriented toward a downstream of the carrying direction, and

the first guide member separates from the medium after a leading edge portion of the medium in a carrying direction of the medium passed through the tip part of the first guide member but before a trailing edge portion of the medium in the carrying direction passes through the tip part of the first guide member.

5. The image forming apparatus according to claim **1**, further comprising:

a drive unit that supplies a drive force that causes the first guide member to move.

6. The image forming apparatus according to claim **1**, further comprising:

a transfer member that transfers the developer images carried on an image carrying surface of the intermediate transfer belt to the medium at the transfer position.

7. The image forming apparatus according to claim **6**, further comprising:

a stretching member that movably stretches the intermediate transfer belt and that is arranged on an upstream side of the transfer member in the carrying direction of the medium.

8. The image forming apparatus according to claim **7**, wherein

the guide part is configured in such a manner that after the first guide member moves, a distance between the first guide surface and the second guide surface becomes larger than a distance between a contact point of the stretching member and the intermediate transfer belt and the second guide surface.

9. The image forming apparatus according to claim **5**, further comprising:

a first medium detection part that detects the thickness of the medium, and

a controller that controls the drive unit to move the first guide member when a detection result by the first medium detection part exceeds a predetermined threshold value.

10. The image forming apparatus according to claim **5**, further comprising:

a first medium detection part that detects the thickness of the medium,

a second medium detection part that detects presence of the medium, and

a controller that controls the drive unit to move the first guide member at a timing when the second medium detection part detects presence of the medium when the detection result by the first medium detection part has exceeded a predetermined threshold value.

11. The image forming apparatus according to claim **1**, wherein the drive force to move the first guide member is applied by the medium that passes while contacting with the first guide member.

12. The image forming apparatus according to claim **7**, wherein

the first guide member includes a tip part of the first guide member oriented toward a downstream of the carrying direction, and

the guide part configured in such a manner that after the first guide member moves, a distance between the tip part of the first guide member and the second guide surface becomes larger than a distance between a contact point between the stretching member and the intermediate transfer belt and the second guide surface.

13. The image forming apparatus according to claim **5**, wherein

the first guide member includes a tip part of the first guide member oriented toward a downstream of the carrying direction;

the image forming apparatus further comprising:

a controller that controls the drive unit to move the first guide member after a leading edge portion of the medium in a carrying direction of the medium passed through the tip part of the first guide member but before a trailing edge portion of the medium in the carrying direction passes through the tip part of the first guide member.

14. The image forming apparatus according to claim **13**, further comprising:

a medium detection part that is arranged on a downstream side of the transfer position and that detects passage of the medium;

wherein the controller controls the drive unit to move the first guide member after the medium detection part detects the passage of the medium.

15. The image forming apparatus according to claim **13**, further comprising:

a medium detection part that is arranged on an upstream side of the transfer position and that detects passage of the medium;

wherein the controller controls the drive unit to move the first guide member after a period of time has passed from when the medium detection part detects the passage of the medium.

16. The image forming apparatus according to claim **13**, further comprising:

a first medium detection part that is arranged on a upstream side of the transfer position and that detects the thickness of the medium, and

a second medium detection part that is arranged on a downstream side of the transfer position and that detects presence of the medium;

wherein the controller controls the drive unit to move the first guide member at a timing when the second medium detection part detects presence of the medium when the detection result by the first medium detection part has exceeded a predetermined threshold value.

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